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INCH-POUND
 MIL-PRF-2912F(SH)
 26 July 1988
 SUPERSEDING
 MIL-S-2912E(SH)
 26 July 1982
 (See 6.7)

PERFORMANCE SPECIFICATION

SYNTHETIC RUBBER COMPOUND, ACID AND OIL RESISTANT

This specification is approved for use within the Naval Sea Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers both the material and the application technique for lining the battery compartments of submarines and other compartments aboard ships with a synthetic rubber compound which is resistant to battery acid and hydrocarbon oils (see 6.1).

1.2 Classification. The lining material shall be of the following types, as specified (see 6.2.1).

Type I - Synthetic rubber which is applied in the unvulcanized state and cured in place by use of heat.

Type II - Synthetic rubber which is applied in the vulcanized state by adhering it to the compartment with adhesives.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 5523, Department of the Navy, Washington, DC 20362-5101 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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SPECIFICATIONS

FEDERAL

- PPP-B-576 - Boxes, Wood, Cleated, Veneer, Paper Overlaid.
- PPP-B-585 - Box, Wood, Wirebound.
- PPP-B-591 - Boxes, Shipping Fiberboard, Wood-Cleated.
- PPP-B-601 - Boxes, Wood, Cleated-Plywood.
- PPP-B-621 - Boxes, Wood, Nailed and Lock-Corner.
- PPP-B-636 - Boxes, Shipping, Fiberboard.
- PPP-C-96 - Cans, Metal, 28 Gage and Lighter.
- PPP-C-2020 - Chemicals, Liquid, Dry, and Paste: Packaging of.
- PPP-D-723 - Drums, Fiber.
- PPP-P-704 - Pails, Metal: (Shipping, Steel, 1 through 12 Gallons).

MILITARY

- MIL-P-116 - Preservation, Methods of.

STANDARDS

FEDERAL

- FED-STD-313 - Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities.

MILITARY

- MIL-STD-129 - Marking for Shipment and Storage.
- MIL-STD-289 - Visual Inspection Guide for Rubber Sheet Material.

(Copies of specifications and standards required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted shall be those listed in the issue of the DoDISS specified in the solicitation. Unless otherwise specified, the issues of the documents not listed in the DoDISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- D 412 - Standard Test Methods for Rubber Properties in Tension. (DoD adopted)
- D 471 - Standard Test Method for Rubber Property - Effect of Liquids. (DoD adopted)
- D 572 - Standard Test Method for Rubber-Deterioration by Heat and Oxygen. (DoD adopted)
- D 2240 - Standard Test Method for Rubber Property - Durometer Hardness. (DoD adopted)

(Application for copies should be addressed to American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

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NATIONAL MOTOR FREIGHT TRAFFIC ASSOCIATION, INC. AGENT
National Motor Freight Classification

(Application for copies should be addressed to the National Motor Freight Traffic Association, Inc., ATA TRAFFIC Dept., 2200 Mill Road, Alexandria, VA 22314.)

UNIFORM CLASSIFICATION COMMITTEE, AGENT
Uniform Freight Classification Ratings, Rules and Regulations

(Application for copies should be addressed to the Uniform Classification Committee Agent, Tariff Publication Officer, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

(Nongovernment standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When specified in the contract or purchase order, a sample shall be subjected to first article inspection (see 4.4 and 6.3).

3.2 Material.

3.2.1 Physical properties. The material in the type I and type II linings shall conform to the physical requirements specified in table I.

TABLE I. Physical requirements of rubber compounds.

	Type I or II	Test procedure
Shrinkage or expansion, percent, maximum (type I only)	0.5	4.6.2
Tensile strength, initial, pounds per square inch (lb/in ²), minimum	1400	4.6.3
Ultimate elongation, initial, percent, minimum	250	4.6.3
Adhesion to steel and between plies, rate of separation under 15-pound load, inches per minute, maximum	1	4.6.4

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TABLE I. Physical requirements of rubber compounds. - Continued

	Type I or II	Test procedure
After oxygen pressure aging:		4.6.5
Tensile strength, percent change from initial, maximum	25	4.6.5.1
Ultimate elongation, percent change from initial, maximum	25	4.6.5.1
Adhesion to steel and between plies, rate of separation under 12-pound load, inches per minute, maximum	1	4.6.5.2
After immersion in acid:		4.6.6
Weight, percent change from initial, maximum	2	4.6.6.1
Tensile strength, percent change from initial, maximum	25	4.6.6.2
Ultimate elongation, percent change from initial, maximum	25	4.6.6.2
After immersion in oil:		4.6.7
Volume, percent change from initial, maximum	15	4.6.7.1
Tensile strength, percent change from initial, maximum	20	4.6.7.2
Ultimate elongation, percent change from initial, maximum	20	4.6.7.2
Adhesion to steel and between plies, rate of separation under 12-pound load, inches per minute, maximum	1	4.6.7.3

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TABLE I. Physical requirements of rubber compounds. - Continued

	Type I or II	Test procedure
Plastic flow characteristics:		4.6.8
Original deflection, inches, maximum	0.020	
Deflection after 48 hours, inches, maximum	0.028	
Increase of deflection after 48 hours, due to plastic flow, inches, maximum	0.010	
Hardness, Shore A durometer	50 to 70	4.6.9
Porosity test for pinholes	none	4.6.10

3.2.2 Recovered materials. Unless otherwise specified herein, all material incorporated in the products covered by this specification shall be new and may be fabricated using materials produced from recovered materials to the maximum extent practicable without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products is allowed under this specification unless otherwise specifically specified.

3.3 Construction. Type I and type II rubber linings shall be 1/8 inch plus 1/16 inch minus 0 inch thick. They shall be applied as two separate layers, each nominally 1/16 inch. Edges and seams shall be straight, and all seams staggered. The edges of the lining shall be cut square.

3.3.1 Type I. The unvulcanized compound used for lining shall be such that vulcanization of the 1/8-inch thickness will be complete and conform to this specification after the exposed side has been subjected to air at a temperature not greater than 175 degrees Fahrenheit (°F) for a period of not more than 6 days. If the contractor requires that the maximum vulcanization temperature be lower than 175°F, the maximum temperature which can be used shall be specified (see 6.2.1). A tie gum may be used if needed to meet the adhesion requirements of this specification; however, the thickness of the tie gum layer shall be not more than 1/32 inch.

3.3.2 Type II. The vulcanized compound used for the lining shall be applied to the steel and itself through the use of primers, adhesives, and putties.

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3.4 Material safety data sheet. The contracting activity shall be provided a material safety data sheet (MSDS) at the time of contract award. The MSDS is DD Form OSHA-20 and is found in and part of FED-STD-313. The MSDS shall be included with each shipment of the material covered by this specification (see 6.5).

3.5 Workmanship. The lining shall be applied in such a manner that the material forms an uninterrupted seal over the entire lined surface and presents a satisfactory finished appearance. Blisters, trapped air, pock marks and open seams in the lining are causes for rejection, and shall be repaired before acceptance of the lining.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.1.2 Inspection system. When specified in the contract or order, an inspection system program plan shall be prepared (see 6.2.2).

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

- (a) First article inspection (see 4.4).
- (b) Quality conformance inspection (see 4.5).

4.3 Preparation of samples and test specimens.

4.3.1 Samples. First article and quality conformance inspections of types I and II rubber compounds shall be performed on a sample prepared as follows: Three steel plates shall be prepared for the quality conformance inspection of the material. One steel plate shall be prepared for the first article inspection. The steel plates, 12 by 12 by 1/8 inches, of same material as the battery compartment, shall be lined on one side using the same primers, adhesives, vulcanized or unvulcanized rubber compounds, procedure and equipment that will be used in the intended application. A 3-inch wide strip of separating material such as aluminum foil shall be located between the two rubber plies along one

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edge of the lining on each plate to facilitate testing for adhesion between plies. The rubber shall be applied using the same material and application technique which will be employed in lining the submarine battery compartment. In the case of type I lining, four marks, each 1 inch long, shall be scribed on the unvulcanized rubber on each plate at right angles to one another and parallel to the edges of the plate. The sample shall then be vulcanized using the atmosphere, time, and temperature which the contractor proposed to use when vulcanizing the lining in the battery compartment.

4.3.2 Test specimens. The test specimens shall be prepared in accordance with the requirements of the tests as specified herein, utilizing the same material and application techniques which will be employed in lining the submarine battery compartment.

4.4 First article inspection. First article inspection of the installation shall consist of the tests specified in 4.4.1.

4.4.1 First article tests. Samples or test specimens of the lining, prepared as specified in 4.3.1 or 4.3.2, as applicable, shall be tested for the following properties:

- (a) Adhesion (see 4.6.4).
- (b) Hardness (see 4.6.9).

4.5 Quality conformance inspection. Quality conformance inspection shall consist of the examinations and tests pertaining to the material (see 4.5.1), and to the installation of this material in the submarine battery compartment (see 4.5.2).

4.5.1 Quality conformance inspection of the material. The following examinations and tests shall be performed on samples or test specimens of the material:

- (a) Shrinkage or expansion - type I only (see 4.6.2).
- (b) Tensile strength and elongation (see 4.6.3).
- (c) Adhesion (see 4.6.4).
- (d) Oxygen pressure aging (see 4.6.5).
 - (1) Tensile strength and elongation (see 4.6.5.1).
 - (2) Adhesion (see 4.6.5.2).
- (e) Immersion in acid (see 4.6.6).
 - (1) Weight (see 4.6.6.1).
 - (2) Tensile strength and elongation (see 4.6.6.2).
- (f) Immersion in oil (see 4.6.7).
 - (1) Volume (see 4.6.7.1).
 - (2) Tensile strength and elongation (see 4.6.7.2).
 - (3) Adhesion (see 4.6.7.3).

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- (g) Plastic flow (see 4.6.8).
- (h) Hardness (see 4.6.9).

4.5.2 Quality conformance inspection of the installation. Quality conformance tests on each battery compartment lining shall consist of the following:

- (a) Visual examination (see 4.6.1).
- (b) Hardness (see 4.6.9).
- (c) Porosity (see 4.6.10).
- (d) Adhesion (if required; see 4.6.4 and 4.6.11).

4.5.3 Rejection. If the material fails to conform to all the requirements for which it is tested, the lot of material represented by the samples or test specimens shall be rejected. If the compartment lining does not conform to the hardness, porosity, and workmanship requirements for which it is tested, the installation shall be rejected.

4.6 Methods of examination and test. No tests shall be made on type I material until at least 48 hours have elapsed after vulcanization. The tie gum layer or type I material shall be tested only for adhesion. No tests shall be made on type II material until the curing time recommended by the contractor or testing facility for the adhesive layer has elapsed; however, this curing time shall not exceed 14 days.

4.6.1 Visual examination. A visual examination shall be conducted to detect defects in workmanship to ensure conformance to 3.5. MIL-STD-289 shall be used to determine and evaluate defects. At the option of the Government inspector, an adhesion test (see 4.6.11) shall be performed as an aid to determine and evaluate defects which are visually suspected.

4.6.2 Shrinkage or expansion. After vulcanization of the type I lining on a flat plate, followed by not less than 48 hours conditioning at room temperature, the distance between the parallel marks on the rubber lining shall be measured in both directions. The shrinkage or expansion of the rubber lining shall be computed from these measurements.

4.6.3 Tensile strength and ultimate elongation. Tensile strength and ultimate elongation shall be determined in accordance with ASTM D 412. Dumb-bell specimens shall be prepared using die C. The material of the specimens shall have a uniform thickness within the range 0.70 to 0.80 inch.

4.6.4 Adhesion. The adhesion between plies and between the rubber and steel shall be measured at room temperature, 70 to 90°F, on a 12 by 12 inch panel after performing the shrinkage test, if applicable (see 4.6.2). The panel shall be cut from the corner section in the case of the first article tests. The lining on the 12 by 12 inch panel shall be cut through to the steel with a sharp knife to give three strips, each 1 by 12 inches, as shown on figure 1. The method for determining adhesion to steel and ply adhesion shall be as shown on figure 1. The panel shall be supported in a horizontal position with the lining on the under side. A sufficient length of the outer

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ply of one strip shall be separated from the inner ply to permit attachment of a clamp. A dead-weight load of 15 pounds (clamp plus weight) shall be suspended from the outer ply, and the rate of separation of the ply measured. This test shall be performed on the outer ply of each of the three strips; then it shall be performed on the inner ply of each of the three strips to evaluate the adhesion between the rubber and the steel. Results shall conform to the specification.

4.6.5 Oxygen pressure aging. Oxygen pressure aging shall be performed using the equipment and procedure specified in ASTM D 572.

4.6.5.1 Effect of aging on tensile and elongation properties. Three dumb-bell specimens prepared as specified in 4.6.3 shall be used. After aging they shall be tested by the procedure specified in 4.6.3.

4.6.5.2 Effect of aging on adhesion. A 4 by 9 inch section cut from one of the 12 by 12 inch panels and having two 1 by 9 inch adhesion test strips in place shall be used. After aging, the specimen shall be conditioned at room temperature for not less than 20 hours nor more than 24 hours before testing. Adhesion tests shall be performed as specified in 4.6.4 except that deadweight load of 12 pounds shall be used.

4.6.6 Immersion in acid. The specimens shall be immersed for 46 hours in a 20 percent solution of sulfuric acid in water maintained at $158 \pm 2^\circ\text{F}$.

4.6.6.1 Effect of acid immersion on weight. The specimens and procedure shall be as described in ASTM D 471 with the following exceptions. After removal from the sulfuric acid solution, the specimens shall be rinsed briefly in tap water (not longer than 5 seconds immersion), carefully dried and let stand on a galvanized wire screen for 1 hour before weighing.

4.6.6.2 Effect of acid immersion on tensile strength and elongation properties. The specimens shall be as specified in 4.6.3. The procedure shall be as specified in ASTM D 471 with the following exceptions: after removal from the sulfuric acid solution, the specimens shall be rinsed briefly in tap water, carefully dried and let stand on a galvanized wire screen for not less than 20 hours nor more than 24 hours before testing. The tensile strengths after immersion shall be based on the original cross section of the constricted portion of the dumbbells.

4.6.7 Immersion in oil. The specimens shall be immersed for 46 hours at room temperature in ASTM reference oil number 3 specified in ASTM D 471.

4.6.7.1 Effect of oil immersion on volume. The specimens and procedure shall be as specified in ASTM D 471. The final weighing shall be completed within 3 minutes after removal from the special testing oil.

4.6.7.2 Effect of oil immersion on tensile strength and elongation properties. The specimens shall be as specified in 4.6.3. The procedure shall be as specified in ASTM D 471. The tensile strengths after immersion shall be based on the final cross section of the constricted portion of the dumbbells.

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4.6.7.3 Effect of oil immersion on adhesion. A 4 by 9 inch section cut from one of the 12 by 12 inch panels and having two 1 by 9 inch adhesion strips in place shall be completely immersed in the oil. At the end of the immersion period the section shall be dipped in acetone, wiped dry, and tested by the procedure specified in 4.6.4, except that a dead-weight load of 12 pounds shall be used.

4.6.8 Plastic flow. A 4 by 4 inch plate with the rubber lining on one face shall be cut from one of the 12 by 12 inch plates. This small plate shall be laid in a horizontal position on a firm base with the rubber lining facing upward. A cylindrical flat indenter of 1 square inch bearing area shall be centered on the rubber lining. The indenter shall be pressed into the rubber with a total dead-weight load of 100 pounds (including the weight of the indenter). The original depth of penetration shall be measured 30 seconds after application of the load. Depth of penetration shall again be measured after the assembly has stood for 48 hours at room temperature. The apparatus for performing this test shall be as shown on figure 2.

4.6.9 Hardness. The hardness of the rubber lining shall be measured with a Shore A durometer following the procedure specified in ASTM D 2240. The reading shall be taken 3 seconds after pressing the durometer against the lining.

4.6.10 Porosity. After the type I lining has been installed and vulcanized, or after the type II lining has been installed, the entire lined surface shall be tested electrically with a high-frequency, high voltage spark delivering a minimum of 10,000 volts. The presence of a pin-hole in the lining will be indicated by a spark jumping from the electrode of the tester to the hole in the lining. The corona from the electrode of the tester shall not be confused with a spark, which shall be distinctly seen and heard. For inspections of compartment linings, pinholes located in this fashion shall be repaired to the satisfaction of the inspector before the lining will be considered acceptable (see 4.5.3).

4.6.11 Adhesion of the lining installed in the battery compartment. The adhesion between plies and between the rubber lining and steel of the battery compartment shall be at 70 to 90°F ambient. The area of the lining shall be cut through to the steel with a sharp knife to provide a single strip 1 by 12 inches. A sufficient length of the outer ply shall be separated from the inner ply to permit attachment of a clamp. A spring scale load shall be suspended from the outer ply to separate it from the inner ply and the rate of separation measured. Similarly, a spring scale load shall be suspended from the inner ply to separate it from the steel, to evaluate the adhesion between the rubber and steel. The following test results shall be obtained for satisfactory performance:

- (a) For the compartment deck, adhesion of the rubber to steel and between plies, rate of separation under load of 15 pounds shall be 1 inch per minute, maximum.
- (b) For the compartment side walls and for stanchions, adhesion of the rubber to steel and between plies, rate of separation under load of 5 pounds shall be 1 inch per minute, maximum.
- (c) No test is required for lining on the forward or after bulkheads of the compartment.

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4.7 Packaging inspection. Sample packages and packs and the inspection of the preservation, packing and marking for shipment and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

5. PACKAGING

(The packaging requirements specified herein apply only for direct Government acquisitions. For the extent of applicability of the packaging requirements of referenced documents listed in section 2, see 6.4.)

5.1 Preservation. Preservation shall be level A or C, as specified (see 6.2.1).

5.1.1 Talc or talcum. Talc or talcum, when used in the packaging process; for example, dusting of items, shall be asbestos free. When specified in the contract or order, a certificate of compliance shall be prepared (see 6.2.2).

5.1.2 Level A.

5.1.2.1 Type I compound. Type I compound in the quantity specified (see 6.2.1), shall be packed as specified in 5.2.

5.1.2.2 Type II compound.

5.1.2.2.1 Sheets. Sheet material shall be furnished in rolls, minimum 36 inches wide and 25 yards long. Each roll shall be unit protected in accordance with method III of MIL-P-116 and shall be individually preserved in a weather-resistant fiberboard box conforming to PPP-B-636. Boxes shall be closed and waterproofed in accordance with method V of the appendix to the box specification.

5.1.2.3 Adhesion material. Priming cement, brushing or spraying compound shall be furnished in type II, class I, 5-gallon pails conforming to PPP-P-704 with a resealable closure. Pails shall be galvanized or otherwise protectively coated to resist corrosion.

5.1.2.4 Cement. The cement shall be furnished in 1-gallon multiple friction cans conforming to PPP-C-96 type V, class 2 with plan B coating and side seams stripping required. Wire handles shall be galvanized or protectively coated to resist corrosion.

5.1.2.5 Troweling material. Troweling material shall be furnished in 1-pound cans of the same type, class and coating as specified in 5.1.2.4. Wire handles are not required.

5.1.2.6 Accelerator. Curing accelerator shall be preserved in the quantity and container required in accordance with the level A preservation requirements of PPP-C-2020.

5.1.3 Level C.

5.1.3.1 Type I compound. Type I compound in the quantity specified (see 6.2.1), shall be packed as specified in 5.2.

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5.1.3.2 Type II compound and associated materials. Type II compound and associated materials shall be preserved in a manner to afford protection against corrosion, deterioration, loss of contents and physical damage during shipment from the supply source to the first receiving activity for immediate use. The contractor's normal retail or wholesale packaging methods may be utilized when such meets the requirements of this level.

5.2 Packing. Packing shall be level A, B or C, as specified (see 6.2.1).

5.2.1 Level A.

5.2.1.1 Type I and II compound. Type I compound and type II compound, preserved as specified in 5.1.2.2.1, shall be packed in containers conforming to any one of the following specifications at the option of the contractor:

<u>Specification</u>	<u>Type or class</u>
PPP-B-576	Class 2
PPP-B-585	Class 3 use
PPP-B-591	Weather-resistant type
PPP-B-601	Overseas type
PPP-B-621	Class 2
PPP-B-636	Weather-resistant type
PPP-D-723	Type II

Containers shall be closed, strapped or banded in accordance with the applicable container specification or appendix thereto with method V closure applicable to PPP-B-636 boxes. Fiberboard boxes shall be reinforced with non-metallic banding or reinforced pressure sensitive tape in lieu of steel strapping. The gross weight of wood or wood-cleated boxes shall not exceed 200 pounds, fiberboard boxes shall not exceed the weight limitations for the box utilized.

5.2.1.2 Adhesion material. Priming cement and brushing or spraying compound shall not require additional packing.

5.2.1.3 Cement. Tie cement and troweling materials shall be packed in accordance with the level A requirements of the appendix to PPP-C-96.

5.2.1.4 Accelerator. Curing accelerators shall be packed in accordance with the level A requirements of PPP-C-2020.

5.2.2 Level B. Materials shall be packed as specified for level A except that domestic type containers and level B packing requirements shall apply.

5.2.3 Level C. Items preserved as specified (see 6.2.1) shall be packed in containers acceptable to the common carrier which will ensure safe delivery at destination in a satisfactory condition at the lowest applicable rate. Containers, packing or method of shipment shall conform to Uniform Freight or National Motor Freight Classification Rules or Regulations or other carrier rules as applicable to the mode of transportation.

5.3 Marking. In addition to any special marking required (see 6.2.1), interior packages and exterior shipping containers shall be marked with the date (month and year) of manufacture and in accordance with MIL-STD-129.

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5.3.1 Hazardous chemicals. Packages containing hazardous chemicals shall have affixed thereto such warning labels and markings as may be required by MIL-STD-129.

6. NOTES

6.1 Intended use. Types I and II synthetic rubber compounds are intended for use where an acid and oil resistant surface is desired for the battery compartments of submarines or other compartments aboard ship. Type I, an unvulcanized compound, is designed to be cured in place through the use of heat. Type II is a prevulcanized material which is lined to the compartment with adhesives.

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- (a) Title, number and date of this specification.
- (b) Type required (see 1.2).
- (c) When first article is required (see 3.1).
- (d) The maximum temperature of vulcanization of type I material (see 3.3.1).
- (e) Levels of preservation and packing required (see 5.1, 5.2 and 5.2.3).
- (f) Quantity required (see 5.1.2.1 and 5.1.3.1).
- (g) That risks attendant upon the packing and shipment of the rubber lining so that material is still usable upon receipt is the responsibility of the contractor until the material is installed in the ship. If there is a possibility of transportation or storage of the material by the Government, special requirements as specified in the contract or order should apply.
- (h) Special marking required (see 5.3).
- (i) The areas to be covered (installation).
- (j) That interior metal surface of the compartment in way of the rubber lining should be prepared by the shipbuilder or the contractor by means of sandblasting, grinding, or chipping, to give a clean metal surface, according to the specification of the contractor. Welds and joints should be ground flush. Compartments during the operation of laying the rubber lining should be adequately ventilated to remove inflammable and noxious fumes by means of a suction draft. The shipbuilder should be responsible for supply, installation, and operation of the ventilating equipment. Blowers should be provided to give a minimum of one change of air every 3 minutes. They should be installed outside of the compartment.

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- (k) That the shipbuilder should be responsible for providing and installing warning signs in the vicinity of the compartment, ventilating blowers and hatches, reading "DANGER - EXPLOSIVE GASES-AVOID WELDING, BURNING, AND SPARKS IN THIS VICINITY."
- (l) That all openings to the compartment in which the lining is being installed should be kept closed except those openings needed for ventilation purposes and for access of the rubber workers, and only persons engaged in the work of installing the rubber lining and the inspector should be allowed to enter the compartment while cure is taking place.

6.2.2 Data requirements. When this specification is used in an acquisition and data are required to be delivered, the data requirements identified below shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved Contract Data Requirements List (CDRL), incorporated into the contract. When the provisions of DoD FAR Supplement, Part 27, Sub-Part 27.475-1 (DD Form 1423) are invoked and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this specification are cited in the following paragraphs.

<u>Paragraph no.</u>	<u>Data requirement title</u>	<u>Applicable DID no.</u>	<u>Option</u>
4.1.2	Inspection system program plan	DI-R-4803	----
5.1.1	Certificate of compliance	DI-E-2121	----

(Data item descriptions related to this specification, and identified in section 6 will be approved and listed as such in DoD 5010.12-L, AMSDL. Copies of data item descriptions required by the contractors in connection with specific acquisition functions should be obtained from the Naval Publications and Forms Center or as directed by the contracting officer.)

6.2.2.1 The data requirements of 6.2.2 and any task in section 3, 4, or 5 of the specification required to be performed to meet a data requirement may be waived by the contracting/acquisition activity upon certification by the offeror that identical data were submitted by the offeror and accepted by the Government under a previous contract for identical item acquired to this specification. This does not apply to specific data which may be required for each contract regardless of whether an identical item has been supplied previously (for example test reports).

6.3 First article. When a first article inspection is required, the item should be a first article sample. The first article should consist of one unit. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results and disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders, offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract.

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6.4 Sub-contracted material and parts. The packaging requirements of referenced documents listed in section 2 do not apply when material and parts are acquired by the contractor for incorporation into the equipment and lose their separate identity when the equipment is shipped.

6.5 Material safety data sheets. Contracting officers will identify those activities requiring copies of completed Material Safety Data Sheets (MSDS) prepared in accordance with FED-STD-313. The pertinent Government mailing addresses for submission of data are listed in FED-STD-313. In order to obtain the MSDS, federal acquisition regulation (FAR) clause 52.223-3 must be in the contract.

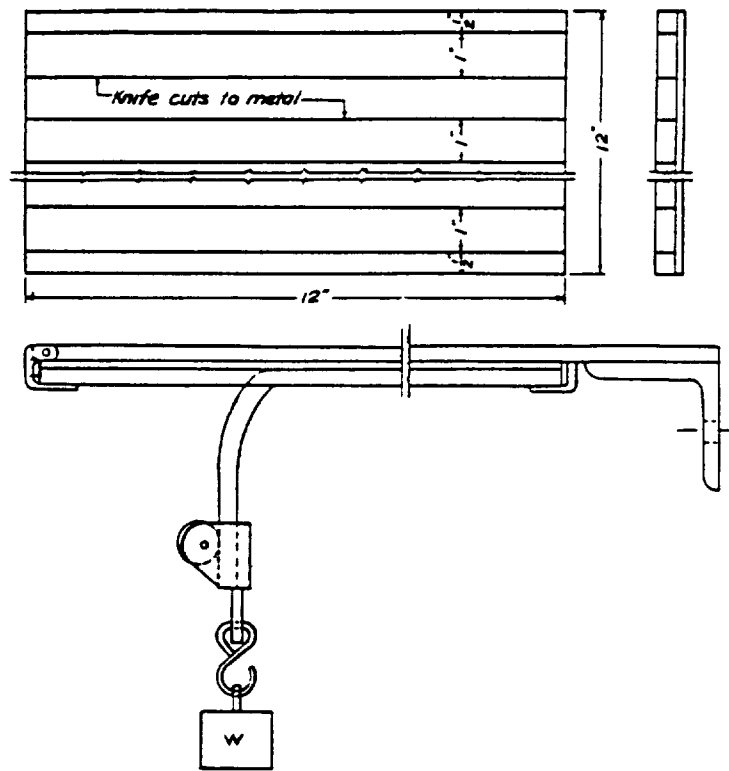
6.6 Subject term (key word) listing.

Battery compartment
Heat cured
Vulcanized

6.7 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Preparing activity:
Navy - SH
(Project 9320-N005)

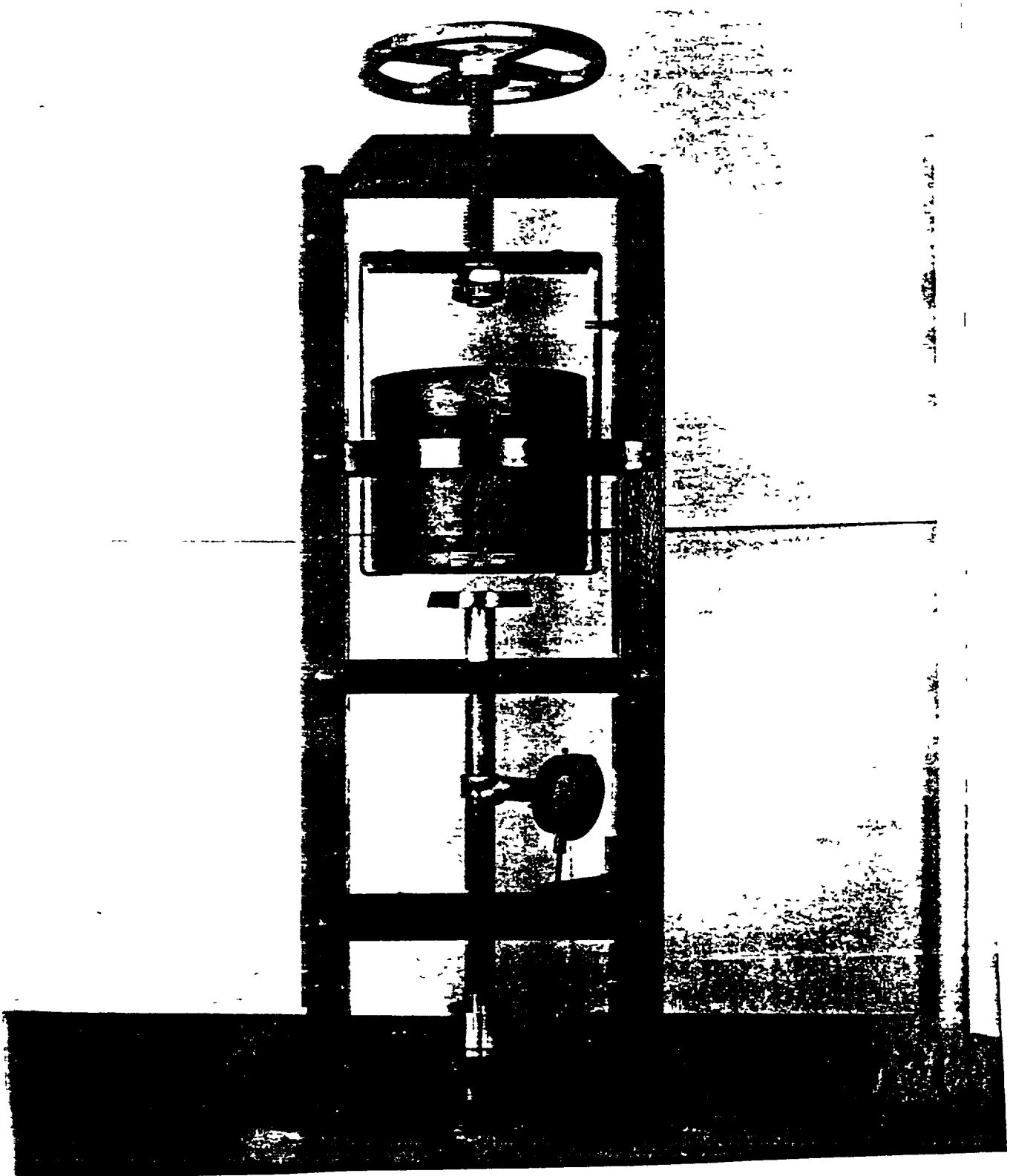
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FIGURE 1. Method for determining adhesion to steel.

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FIGURE 2. Apparatus for measuring plastic flow characteristics of rubber.

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1 DOCUMENT NUMBER MIL-S-2912F(SH)		2 DOCUMENT TITLE SYNTHETIC RUBBER COMPOUND, ACID AND OIL RESISTANT	
3a. NAME OF SUBMITTING ORGANIZATION		4 TYPE OF ORGANIZATION (Mark one)	
b ADDRESS (Street, City, State, ZIP Code)		<input type="checkbox"/> VENDOR	
		<input type="checkbox"/> USER	
5 PROBLEM AREAS		<input type="checkbox"/> MANUFACTURER	
		<input type="checkbox"/> OTHER (Specify) _____	
		a. Paragraph Number and Wording	
		b. Recommended Wording	
		c. Reason/Rationale for Recommendation	
6 REMARKS			
7a NAME OF SUBMITTER (Last First, MI) - Optional		b WORK TELEPHONE NUMBER (Include Area Code) - Optional	
c MAILING ADDRESS (Street, City, State ZIP Code) - Optional		8 DATE OF SUBMISSION (YYMMDD)	

(TO DETACH THIS FORM, CUT ALONG THIS LINE)